

CLAIMS

1. A method of forming a self-gated transistor  
 5 comprising:  
     coupling a transistor operable to form a sense signal  
     representative of a current through the self-gated  
     transistor; and  
     coupling a comparator to receive the sense signal and  
 10 responsively control the self-gated transistor based upon a  
     polarity of the sense signal.
  
2. The method of claim 1 wherein forming the  
     transistor operable to form the sense signal representative  
 15 of the current through the self-gated transistor includes  
     forming a transistor having a main transistor portion and a  
     sense transistor as a sensing portion including coupling  
     the main transistor portion to the sensing portion wherein  
     the sensing portion is operable to form the sense signal  
 20 representative of the current through the self-gated  
     transistor.
  
3. The method of claim 2 wherein coupling the main  
     transistor portion to the sensing portion includes coupling  
 25 a drain of the sense transistor to a drain of the main  
     transistor portion and to the drain of the self-gated  
     transistor and also including coupling a gate of the sense  
     transistor to a gate of the main transistor portion and to  
     the gate of the self-gated transistor.  
 30
  
4. The method of claim 1 wherein coupling the  
     comparator to receive the sense signal includes coupling an  
     inverting input of the comparator to receive the sense  
     signal.  
 35

5. The method of claim 1 wherein coupling the comparator to receive the sense signal includes coupling a non-inverting input of the comparator to have a negative offset voltage.

5

6. The method of claim 1 wherein coupling the comparator to receive the sense signal and responsively drive the self-gated transistor based upon a polarity of the sense signal includes coupling the comparator to  
10 responsively enable the self-gated transistor when the sense signal forms a voltage that is less than a voltage of a source of the self-gated transistor.

7. The method of claim 1 wherein coupling the  
15 comparator to receive the sense signal includes coupling one of a diode or a resistor between a source of a sense transistor and a source of the self-gated transistor.

8. A method of operating a self-gated transistor comprising:

providing an MOS transistor having a main transistor portion and a sensing portion including coupling the main transistor portion to the sensing portion wherein the  
5 sensing portion is operable to form a first sense signal representative of a first current through the main transistor portion;  
detecting the first sense signal and responsively  
10 disabling the self-gated transistor;  
conducting a second current through the sensing portion as a second sense signal wherein the second current flows in a direction opposite to the first current; and  
detecting the second sense signal and responsively  
15 enabling the self-gated transistor.

9. The method of claim 8 wherein conducting the second current through the sensing portion as the second sense signal includes conducting the second current to flow  
20 through a diode.

10. The method of claim 8 wherein conducting the second current through the sensing portion as the second sense signal includes conducting the second sense current  
25 to flow through a resistor.

11. The method of claim 8 wherein detecting the first sense signal and responsively disabling the self-gated transistor includes receiving the first sense signal on an  
30 input of a comparator.

12. A self-gated transistor comprising:
  - a transistor having a main transistor portion and a sensing portion wherein the sensing portion is coupled to the main transistor portion to form a sense signal
  - 5 representative of a current through the self-gated transistor, the main transistor portion having a first gate; and
  - a comparator coupled to receive the sense signal and drive the first gate.
- 10 13. The self-gated transistor of claim 12 wherein the comparator has an inverting input coupled to receive the sense signal.
- 15 14. The self-gated transistor of claim 13 wherein the comparator has a non-inverting input coupled to a source of the self-gated transistor.
- 20 15. The self-gated transistor of claim 14 wherein the non-inverting input of the comparator has a negative offset voltage.
- 25 16. The self-gated transistor of claim 12 wherein the sensing portion is a portion of the main transistor portion with a source of the sensing portion separated from a source of the main transistor portion and wherein the main transistor portion and the sensing portion have a common drain.
- 30 17. The self-gated transistor of claim 12 further including the sensing portion having a source that is separate from a source of the main transistor portion and a protection circuit coupled to the source of the sensing portion.
- 35

18. The self-gated transistor of claim 12 wherein a source of the main transistor portion is coupled to a source of the self-gated transistor.

5        19. The self-gated transistor of claim 12 further including a voltage regulator coupled to provide an operating voltage to the comparator and coupled to a source of the self-gated transistor.

10       20. The self-gated transistor of claim 12 further including the self-gated transistor formed in a package having no greater than four leads.